Beamline 22-ID / SER-CAT

Scientific focus: Macromolecular crystallography

Scientific program: Structural biology

Summary reflects projected performance parameters and planned equipment and hardware.

Optics & Optical Performance

- 6–20 keV standard spectral range
- 0.08 mm hor. x 0.04 mm vert. FWHM focused beam size
- Rosenbaum-Rock monochromator
  - high-resolution double-crystal
  - sagittal focusing
  - 1st crystal, Si(220), liquid-nitrogen cooling
  - 2nd crystal, Si(220), 10 mm W (stabilized at 25°C, sagittally bent)
  - 7:1 demagnification
  - 6.5°–38° Bragg angle range
  - 35 mm beam offset (nominal)
  - motorized tune, twist, & roll control (4 mm range, 50 nm resolution)
- Rosenbaum-Rock vertical focusing mirror
  - 11:1 demagnification
  - ULE plane mirror substrate, 43 mm thick
  - 1000 mm L x 90 mm W
  - clear aperture
  - 2 Å rms roughness
  - 1 µrad rms surface figure error
  - Pt, none, Pd coating stripes (30 mm W ea.)
  - two motorized, encoded supports
  - dynamic, independent bending mechanism at both ends
  - aberration correction via elliptical bending

Experiment Stations

22-ID-A

- white beam enclosure

22-ID-C

- white beam optics enclosure

22-ID-D

- monochromatic experiment station
- kappa goniostat for macromolecular crystallography
- adjustable collimator slits
- filter/shutter
- detector support and positioner

Detectors

- CCD area detector (Bruker PROTEUM 300)

Beamline Controls and Data Acquisition

- detector control and interface hardware and software to be defined
- beamline control and data acquisition software: MX system (some components to be defined)
- computers to be defined
- DC-servomotor; PMAC motor controller
- electrometer amplifiers; VME-based, computer-controlled V/F converter and scaler (ANL-ECT design)

Beamline Support Equipment/Facilities

- Rosenbaum-Rock miniaturized kappa goniostat
- high-magnification alignment cameras (two)
- Rosenbaum-Rock high-precision detector support and positioner
- liquid-nitrogen cryosystem sample cooler

Insertion Device Source Characteristics (nominal)

source	Undulator A
period	3.30 cm
length	2.47 m
effective K_{max} (at minimum gap = 10.5 mm)	2.78
energy range 1st harmonic	2.9 - 13.0 keV
energy range 1st - 5th harmonics	2.9 - 45.0 keV
on-axis peak brilliance at 6.5 keV	9.6×10^{18} ph/sec/mrad²/mm²/0.1% bw
source size at 8.0 keV Σ_x Σ_y	 359 μm 21 μm
source divergence at 8.0 keV $\Sigma_{x'}$ $\Sigma_{y'}$	 24 μrad 6.9 μrad